

## **APPENDIX A**

# **STOCK ASSESSMENT AND FISHERY EVALUATION REPORT FOR THE GROUND FISH RESOURCES OF THE BERING SEA/ALEUTIAN ISLANDS REGIONS**

Compiled by

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**Stock Assessment and Fishery Evaluation Report  
for the Groundfish Resources  
of the Bering Sea/Aleutian Islands Region**

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## SUMMARY

By

The Plan Team for the Groundfish Fisheries of the Bering Sea and Aleutian Islands

## INTRODUCTION

The Guidelines for Fishery Management Plans published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). The SAFE report summarizes the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries that are managed under Federal regulation. It provides information to the Councils for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery management programs. For the FMP for the Groundfish Fishery of the Bering Sea and Aleutian Islands (BSAI) Area, the SAFE report is published in three sections: a “Stock Assessment” section, which comprises the bulk of the present document, and “Economic Status of Groundfish Fisheries off Alaska” and “Ecosystem Considerations” sections, which are bound separately.

The BSAI Groundfish FMP requires that a draft of the SAFE report be produced each year in time for the December meeting of the Council. Each stock or stock complex is represented in the SAFE report by a chapter containing the latest stock assessment. New or revised stock assessment models are generally previewed at the September Plan Team meeting, and considered again by the Plan Team at its November meeting for recommending final specifications for the following two fishing years.

The Stock Assessment section of the SAFE report for the BSAI groundfish fisheries is compiled by the BSAI Groundfish Plan Team from chapters contributed by scientists at NMFS Alaska Fisheries Science Center (AFSC). These chapters include a recommendation by the author(s) for overfishing level (OFL) and acceptable biological catch (ABC) for each stock and stock complex managed under the FMP. This introductory section includes the recommendations of the Plan Team. The ABC recommendations are reviewed by the Scientific and Statistical Committee (SSC), which may confirm the Plan Team recommendations or develop its own. The ABC recommendations, together with social and economic factors, are considered by the North Pacific Fishery Management Council (Council) in determining total allowable catches (TACs) and other measures used to manage the fisheries. Neither the author(s), Plan Team, nor SSC recommends TACs.

Members of the Plan Team who compiled this SAFE report were Loh-lee Low (chair), Jane DiCosimo (BSAI FMP coordinator), Kerim Aydin, David Carlile, William Clark, Dan Lew, Brenda Norcross, Michael Sigler (vice chair), Andrew Smoker, Grant Thompson, and Ivan Vining.

## BACKGROUND INFORMATION

### Management Areas and Species

The BSAI management area lies within the 200-mile U.S. Exclusive Economic Zone (EEZ) of the United States (Figure 1). International North Pacific Fisheries Commission (INPFC) statistical areas 1 and 2 comprise the EBS. The Aleutian Islands (AI) region is INPFC area 5.

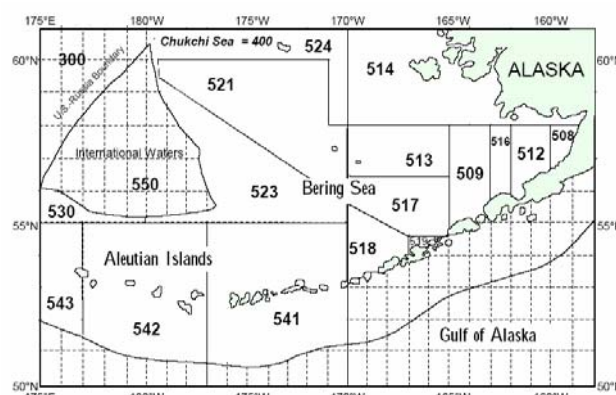


Figure 1. Bering Sea and Aleutian Islands statistical and reporting Areas

Five categories of finfishes and invertebrates have been designated for management purposes (see below). They are prohibited species (species which must be returned to the sea when caught), target species (species for which an individual TAC is established), other species (species for which an aggregate TAC is established), forage fish, and non-specified species (all species not included in one of the other categories). This SAFE report describes the status of the stocks in the target species and “other species” categories only. For finfish, the species categories other than non-specified species are populated as follow:

<b><u>Prohibited Species</u></b>	<b><u>Target Species</u></b>	<b><u>Other Species</u></b>	<b><u>Forage Fish</u></b>
Salmon	Walleye pollock	Sculpins	Eulachon
Pacific halibut	Pacific cod	Sharks	Capelin
Pacific herring	Sablefish	Skates	Sandlance
Steelhead trout	Yellowfin sole		Myctophids
	Greenland turbot		Bathylagids
	Arrowtooth flounder		Sandfish
	Northern rock sole		Pholids
	Flathead Sole		Stichaeids
	Alaska plaice		Gonostomatids
	Other flatfish		
	Pacific Ocean perch		
	Northern rockfish		
	Shortraker rockfish		
	Rougheye rockfish		
	Other rockfish		
	Atka mackerel		

For invertebrates, the species categories other than non-specified species are populated as follow:

<b><u>Prohibited Species</u></b>	<b><u>Target Species</u></b>	<b><u>Other Species</u></b>	<b><u>Forage Fish</u></b>
King crab		Squid	
Tanner crab		Octopus	

### **Historical Catch Statistics**

Catch statistics since 1954 are shown for the EBS subarea in Table 2. The initial target species was yellowfin sole. During the early period of these fisheries, total catches of groundfish reached a peak of 674,000 metric tons (t) in 1961. Following a decline in abundance of yellowfin sole, other species (principally walleye pollock) were targeted, and total catches rose to 2.2 million t in 1972. Walleye pollock is now the principal fishery, with recent catches approximately 1.4-1.5 million t in 2001-2005. After the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was adopted in 1976, catch restrictions and other management measures were placed on the fishery and all-species catches have since varied from one to two million t.

Catches in the Aleutian Islands region have always been much smaller than in the EBS. Target species have also been different (Table 3). Pacific ocean perch (POP) was the initial target species. As POP abundance declined, the fishery diversified to other species. During the early years of exploitation, overall catches of Aleutian groundfish reached a peak of 112,000 t in 1965. Atka mackerel is the largest fishery (58,500 t in 2005) in the AI, followed by Pacific cod (22,100 t in 2005). Total catches from the Aleutians in recent years have been about 100,000 t annually, after peaking at 191,000 t in 1996. Total 2004 BSAI catches through October 29 were 1.85 million t. Table 4 provides total EBS and AI catches, 1954 through October 29, 2005.

### **Recent Total Allowable Catches**

Amendment 1 to the BSAI Groundfish FMP provides the framework to manage the groundfish resources as a complex. Maximum sustainable yield (MSY) for the BSAI groundfish complex was originally estimated at 1.8

to 2.4 million t. The optimum yield (OY) range was set at 85% of the MSY range, or 1.4 to 2.0 million t. The sum of the TACs equals OY for the complex, which is constrained by the 2.0 million t cap.

Fifteen percent (15%) of the total TACs is set aside as a reserve (except for pollock, squid, and hook-and-line and pot gear allocation of sablefish), which may be released during the season by the NMFS Regional Administrator. The ITAC, or initial TAC, for each species or complex is the remainder of the TAC after the subtraction of the reserve. Except as noted above, one half of the reserve, or 7.5 percent, is designated as a Community Development Quota (CDQ) reserve for use by CDQ participants. Ten percent of the pollock TAC is allocated as a directed fishing allowance for CDQ participants. The reserve is released to directed fishing later in the fishing year.

## Definition of Acceptable Biological Catch and the Overfishing Level

Amendment 56 defined ABC and OFL for the BSAI groundfish fisheries. The definitions are shown below, where the fishing mortality rate is denoted  $F$ , stock biomass (or spawning stock biomass, as appropriate) is denoted  $B$ , and the  $F$  and  $B$  levels corresponding to MSY are denoted  $F_{MSY}$  and  $B_{MSY}$  respectively.

Acceptable Biological Catch describes the acceptable harvest (or range of harvests) for a given stock or stock complex. Its derivation focuses on the status and dynamics of the stock, environmental conditions, other ecological factors, and prevailing technological characteristics of the fishery. The fishing mortality rate used to calculate ABC is described following the next paragraph.

Overfishing is defined as any amount of fishing in excess of the maximum fishing mortality threshold (MFMT). This MFMT is prescribed through a set of six tiers which are listed below in descending order of preference, corresponding to descending order of information availability. The SSC has final authority for determining whether a given item of information is “reliable” for the purpose of this definition, and may use either objective or subjective criteria in making such determinations. For Tier 1, a “pdf” refers to a probability density function. For Tiers 1-2, if a reliable pdf of  $B_{MSY}$  is available, the preferred point estimate of  $B_{MSY}$  is the geometric mean of its pdf. For Tiers 1-5, if a reliable pdf of  $B$  is available, the preferred point estimate is the geometric mean of its pdf. For Tiers 1-3, the coefficient  $\alpha$  is set at a default value of 0.05, with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For Tiers 2-4, a designation of the form “ $F_{X\%}$ ” refers to the  $F$  associated with an equilibrium level of spawning per recruit (SPR) equal to  $X\%$  of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view SPR calculations based on a knife-edge maturity assumption as reliable. For Tier 3, the term  $B_{40\%}$  refers to the long-term average biomass that would be expected under average recruitment and  $F=F_{40\%}$ .

### Tiers used to determine ABC and OFL for BSAI groundfish stocks.

- (1) Information available: Reliable point estimates of  $B$  and  $B_{MSY}$  and reliable pdf of  $F_{MSY}$ .
  - 1a) Stock status:  $B/B_{MSY} > 1$   
 $F_{OFL} = m_A$ , the arithmetic mean of the pdf  
 $F_{ABC} \leq m_H$ , the harmonic mean of the pdf
  - 1b) Stock status:  $a < B/B_{MSY} \leq 1$   
 $F_{OFL} = m_A \times (B/B_{MSY} - a)/(1 - a)$   
 $F_{ABC} \leq m_H \times (B/B_{MSY} - a)/(1 - a)$
  - 1c) Stock status:  $B/B_{MSY} \leq a$   
 $F_{OFL} = 0$   
 $F_{ABC} = 0$
- (2) Information available: Reliable point estimates of  $B$ ,  $B_{MSY}$ ,  $F_{MSY}$ ,  $F_{30\%}$ , and  $F_{40\%}$ .
  - 2a) Stock status:  $B/B_{MSY} > 1$   
 $F_{OFL} = F_{MSY} \times (F_{30\%}/F_{40\%})$   
 $F_{ABC} \leq F_{MSY}$
  - 2b) Stock status:  $a < B/B_{MSY} \leq 1$   
 $F_{OFL} = F_{MSY} \times (F_{30\%}/F_{40\%}) \times (B/B_{MSY} - a)/(1 - a)$   
 $F_{ABC} \leq F_{MSY} \times (B/B_{MSY} - a)/(1 - a)$
  - 2c) Stock status:  $B/B_{MSY} \leq a$   
 $F_{OFL} = 0$   
 $F_{ABC} = 0$
- (3) Information available: Reliable point estimates of  $B$ ,  $B_{40\%}$ ,  $F_{30\%}$ , and  $F_{40\%}$ .
  - 3a) Stock status:  $B/B_{40\%} > 1$   
 $F_{OFL} = F_{30\%}$   
 $F_{ABC} \leq F_{40\%}$
  - 3b) Stock status:  $a < B/B_{40\%} \leq 1$   
 $F_{OFL} = F_{30\%} \times (B/B_{40\%} - a)/(1 - a)$   
 $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - a)/(1 - a)$
  - 3c) Stock status:  $B/B_{40\%} \leq a$   
 $F_{OFL} = 0$   
 $F_{ABC} = 0$
- (4) Information available: Reliable point estimates of  $B$ ,  $F_{30\%}$ , and  $F_{40\%}$ .
  - $F_{OFL} = F_{30\%}$   
 $F_{ABC} \leq F_{40\%}$
- (5) Information available: Reliable point estimates of  $B$  and natural mortality rate  $M$ .
  - $F_{OFL} = M$   
 $F_{ABC} \leq 0.75 \times M$
- (6) Information available: Reliable catch history from 1978 through 1995.
  - $OFL =$  the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information  
 $ABC \leq 0.75 \times OFL$

## OVERVIEW OF “STOCK ASSESSMENT” SECTION

### Summary and Use of Terms

Plan Team recommendations for 2006 and 2007 ABCs are summarized in Tables 1, 5 and 6. The sum of the recommended ABCs for 2006 is 3,060,000 t, approximately 12,300 t above the sum of the 2005 ABCs. This is about 1.1 million t above the 2 million t cap employed by the Council as a conservation measure in setting TACs. Overall, the status of the stocks continues to appear relatively favorable, although some stocks are declining due to poor recruitment in recent years. Total biomass for 2006 (17.4 million t) is roughly equal to last year's estimate. Stock status is summarized, ABC recommendations are given, and OFLs presented on a species-by-species basis in the remainder of this section, with the following conventions observed:

- “Fishing mortality rate” refers to the full-selection  $F$  (i.e., the rate that applies to fish of fully selected sizes or ages), except in the case of the EBS walleye pollock assessment. For EBS walleye pollock, the fishing mortality rate consists of the ratio between catch (in biomass) and age 3+ biomass at the start of the year.
- “Projected age+ biomass” refers to the total biomass of all cohorts of ages greater than or equal to some minimum age, as projected for January 1 of the coming year. The minimum age varies from species to species. When possible, the minimum age corresponds to the age of recruitment listed in the respective stock assessment. Otherwise, the minimum age corresponds to the minimum age included in the assessment model, or to some other early age traditionally used for a particular species. When a biomass estimate from the trawl survey is used as a proxy for projected age+ biomass, the minimum age is equated with the age of recruitment, even though the survey may not select that age fully and undoubtedly selects fish of younger ages to some extent.
- “Exploitation rate” refers to the ratio between catch (in numbers) and start-of-year stock size (also in numbers). Where information is lacking, the exploitation rate is sometimes multiplied by start-of-year biomass to compute ABC.
- Projected ABC, OFL, and biomass levels are reported to three significant digits, except when quoting a Council-approved value with more than three significant digits or when a stock-specific ABC is apportioned among areas on a percentage basis, in which case four significant digits may be used if necessary to avoid rounding error. Fishing mortality rates are reported to two significant digits.
- The figures listed as last year's ABCs correspond to the values approved by the Council. The figures listed as future ABCs correspond to the Plan Team's recommendations.
- Reported catches are as of October 29, 2005.

### Projection Scenarios and Status Determination

A standard set of projections is required for each stock managed under tiers 1, 2, or 3 of Amendment 56. This set of projections encompasses seven harvest scenarios designed to satisfy the requirements of Amendment 56, the National Environmental Policy Act, and the MSFCMA.

For each scenario, the projections begin with the vector of 2005 numbers at age estimated in the assessment. This vector is then projected forward to the beginning of 2006 using the schedules of natural mortality and selectivity described in the assessment and the best available estimate of total (year-end) catch for 2005. In each subsequent year, the fishing mortality rate is prescribed on the basis of the spawning biomass in that year and the respective harvest scenario. In each year, recruitment is drawn from a distribution whose parameters consist of maximum likelihood estimates determined from the time series of recruitments estimated in the assessment. Because an environmental regime shift appears to have occurred around 1977, only year classes spawned after 1976 are included in this time series. Spawning biomass is computed in each year based on the time of peak spawning and the maturity and weight schedules described in the assessment. Total catch is assumed to equal the catch associated with the respective harvest scenario in all years. This projection scheme is run 1,000 times to obtain distributions of possible future stock sizes, fishing mortality rates, and catches.

Five of the seven standard scenarios will be used in an Environmental Assessment prepared in conjunction with the SAFE report. These five scenarios, which are designed to provide a range of harvest alternatives that are likely to bracket the final TACs for 2006 and 2007, are as follow (“max  $F_{ABC}$ ” refers to the maximum permissible value of  $F_{ABC}$  under Amendment 56):

- Scenario 1: In all future years,  $F$  is set equal to max  $F_{ABC}$ . (Rationale: Historically, TAC has been constrained by ABC, so this scenario provides a likely upper limit on future TACs.)
- Scenario 2: In all future years,  $F$  is set equal to a constant fraction of max  $F_{ABC}$ , where this fraction is equal to the ratio of the  $F_{ABC}$  value for 2006 recommended in the assessment to the max  $F_{ABC}$  for 2006. (Rationale: When  $F_{ABC}$  is set at a value below max  $F_{ABC}$ , it is often set at the value recommended in the stock assessment.)
- Scenario 3: In all future years,  $F$  is set equal to 50% of max  $F_{ABC}$ . (Rationale: This scenario provides a likely lower bound on  $F_{ABC}$  that still allows future harvest rates to be adjusted downward when stocks fall below reference levels.)
- Scenario 4: In all future years,  $F$  is set equal to the average  $F$  from the period 2000-2004. (Rationale: For some stocks, TAC can be well below ABC, and recent average  $F$  may provide a better indicator of  $F_{TAC}$  than  $F_{ABC}$ .)
- Scenario 5: In all future years,  $F$  is set equal to zero. (Rationale: In extreme cases, TAC may be set at a level close to zero.)

Two other scenarios are needed to satisfy the MSFCMA’s requirement to determine whether a stock is currently in an overfished condition or is approaching an overfished condition. These two scenarios are as follow (for Tier 3 stocks, the MSY level is defined as  $B_{35\%}$ ):

Scenario 6: In all future years,  $F$  is set equal to  $F_{OFL}$ .

- Scenario 7: In 2006 and 2007,  $F$  is set equal to max  $F_{ABC}$ , and in all subsequent years,  $F$  is set equal to  $F_{OFL}$ .

Harvest scenarios #6 and #7 are intended to permit determination of the status of a stock with respect to its minimum stock size threshold (MSST). Any stock that is below its MSST is defined to be overfished. Any stock that is expected to fall below its MSST in the next two years is defined to be approaching an overfished condition. Harvest scenarios #6 and #7 are used in these determinations as follows:

Is the stock overfished? This depends on the stock’s estimated spawning biomass in 2006:

- (1) If spawning biomass for 2006 is estimated to be below  $\frac{1}{2} B_{35\%}$ , the stock is below its MSST. If spawning biomass for 2006 is estimated to be above  $B_{35\%}$ , the stock is above its MSST.
- (2) If spawning biomass for 2006 is estimated to be above  $\frac{1}{2} B_{35\%}$  but below  $B_{35\%}$ , the stock’s status relative to MSST is determined by referring to harvest scenario #6. If the mean spawning biomass for 2016 is below  $B_{35\%}$ , the stock is below its MSST. Otherwise, the stock is above its MSST.

Is the stock approaching an overfished condition? This is determined by referring to harvest scenario #7:

- (1) If the mean spawning biomass for 2008 is below  $\frac{1}{2} B_{35\%}$ , the stock is approaching an overfished condition.

- (2) If the mean spawning biomass for 2008 is above  $B_{35\%}$ , the stock is not approaching an overfished condition.
- (3) If the mean spawning biomass for 2008 is above  $\frac{1}{2} B_{35\%}$  but below  $B_{35\%}$ , the determination depends on the mean spawning biomass for 2018. If the mean spawning biomass for 2018 is below  $B_{35\%}$ , the stock is approaching an overfished condition. Otherwise, the stock is not approaching an overfished condition.

It is currently impossible to evaluate the status of stocks in Tiers 4 through 6 with respect to their MSSTs because reference stock levels (such as MSST) cannot be estimated reliably.

### **Two-Year OFL and ABC Projections**

Amendment 48 to the BSAI Groundfish FMP made two significant changes with respect to the stock assessment process. The first significant change has to do with assessments of BSAI rockfish. Because these assessments are dependent largely on data from the EBS slope survey and the Aleutian Islands shelf survey and because these surveys are currently conducted only in even-numbered years, few new data for the BSAI rockfish assessments become available during odd-numbered years. Therefore, SAFE chapters pertaining to BSAI rockfish will not include full updates during odd-numbered years (such as this one).

The second significant change is that recommendations for ABC and OFL are required for each of the next two years. In September of this year, preliminary projections of ABC and OFL for 2006 and 2007 were made on the basis of last year's stock assessments. In this SAFE report, the Plan Team has revised most of those projections (Table 1). Such revisions are typically due to the development of new models; collection of new catch, survey, age composition, or size composition data; or use of new methodology for recommending ABC.

In the case of stocks managed under Tier 3, 2006 and 2007 ABC projections are typically based on the output for Scenarios 1 or 2 from the standard projection model. Projections for 2006 OFL are based on the output for Scenario 6 from the standard projection model. Accurate projections for 2007 OFL, however, require a modification of Scenario 6, because Scenario 6 assumes that catch in each year of the projection will equal OFL. Because it is very likely that the actual catch in 2006 (or any year, for that matter) will be substantially less than OFL, projections of 2007 OFL were based on a modification of Scenario 6 in which projected catch for 2006 is fixed at the chapter author's best estimate. For example, if the actual catch for a particular species is typically close to the ABC, the author might set 2006 catch equal to the recommended ABC. Alternatively, if the actual catch for a particular species is typically much less than ABC, the author might set the 2006 catch equal to the recent average catch.

For the one stock managed under Tier 1, EBS walleye pollock, the Plan Team's recommended 2006-2007 ABCs and OFLs do not appear in the outputs from the standard projection model (Table 1.23), because the standard projection model does not yet include an option for stocks managed under Tier 1. It is expected that the standard projection model will be modified to incorporate a full Tier 1 option in the future. In the meantime, the authors of the EBS pollock assessment have provided an abbreviated set of 2-year projections for ABC and OFL (Table 1.24) that formed the basis for the Team's recommend values.

In the case of stocks managed under Tiers 4-6, 2007 projections are set equal to the Plan Team's recommended values for 2006.

The 2007 ABC and OFL values recommended in next year's SAFE report are likely to differ from this year's projections for 2007, for the same reasons that the 2006 projections in this SAFE report differ from those made in September.



### Uncertainty / Ecosystem Considerations / Research

Statistical uncertainty is addressed in the individual assessments, and to some degree, by the tiers used to establish ABCs. In one case, statistical uncertainty or natural variability in the stock led the Plan Team to recommend 2006 and 2007 ABC values lower than the maximum permissible level. For Greenland turbot, the Plan Team's recommended ABC is 76 percent below the maximum permissible level.

Ecosystem considerations are also addressed in the stock assessment chapters. In several assessments (walleye pollock, Pacific cod, yellowfin sole, arrowtooth flounder, northern rock sole, flathead sole), attempts are made to estimate relationships between bottom trawl survey catchability and bottom temperature. In some assessments (rock sole, flathead sole, Alaska plaice), potential effects of a possible 1989 regime shift on the stock-recruitment relationship are investigated (the yellowfin sole included a similar analysis for the 1978 regime shift). The EBS walleye pollock assessment and the Atka mackerel assessment incorporated results from ecosystem models. Although the Team was unable to identify any cases where these or other ecosystem considerations suggested a need to adjust ABC, the Team encourages further development of ecosystem considerations. A review of ecosystem status and trends is provided in the Ecosystem Considerations chapter.

### Walleye Pollock

Status and catch specifications (t) of pollock in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
EBS	2004	11,000,000	2,740,000	2,560,000	1,492,000	1,481,678
	2005	8,410,000	2,100,000	1,960,000	1,478,500	1,483,096
	2006	8,050,000	2,090,000	1,930,000	n/a	n/a
	2007	n/a	1,930,000	1,790,000	n/a	n/a
AI	2004	175,000	52,600	39,400	1,000	1,172
	2005	344,000	39,100	29,400	19,000	1,621
	2006	130,000	39,100	29,400	n/a	n/a
	2007	n/a	39,100	29,400	n/a	n/a
Bogoslof*	2004	198,000	39,600	2,570	50	0
	2005	198,000	39,600	2,570	10	0
	2006	253,000	50,600	38,000	n/a	n/a
	2007	n/a	50,600	38,000	n/a	n/a

\*The approach used by the Plan Team for recommending Bogoslof ABC in 2006-2007 differs from the approach used by the SSC and Council in previous years.

### *Eastern Bering Sea:*

The present assessment is a straightforward update of last year's assessment, incorporating new data from the 2005 bottom trawl survey and the 2004 fishery and revised estimates of the age composition observed during the 2004 EIT survey. The 2005 bottom trawl survey estimated a biomass of 5,130,000 t, up 37% from the 2004 estimate.

Six alternative models are presented in the chapter, all of which follow the statistical age-structured approach that has been used for the last several years. All of these models give point estimates of 2006 age 3+ biomass in the range 7,610,000 t to 11,800,000 t. Concurring with the assessment authors, the Plan Team based its recommendations for 2006 on the reference model (Model 1), which is essentially identical to last year's model. The current assessment provides estimates of biomass that are very close to those provided in last year's assessment throughout most of the time series, though the new estimates are slightly higher in the most recent

years (Figure 1.35). These increased biomass estimates are due in part to an increase in the estimated strength of the 2000 year class. The estimated strength of this year class has increased in each of the last few assessments. This year, the 2000 year class appeared strong in the 2005 bottom trawl survey and the revised age composition from the 2004 EIT survey. While the 2000 year class appears much stronger than average, all other year classes spawned after 1996 appear weaker than average, with the exception of the 1999 year class, which appears to be about average (Figure 1.38).

The SSC has determined that reliable estimates of  $B_{MSY}$  and the probability density function for  $F_{MSY}$  exist for this stock, and that EBS walleye pollock therefore qualify for management under Tier 1. The senior assessment author continues to feel that the Tier 1 reference points are reliably estimated given the structure of the model, a conclusion with which the Plan Team concurs. The updated estimate of  $B_{MSY}$  from the present assessment is 2,120,000 t, compared to 2,230,000 t from last year's assessment. The projected spawning biomass for 2006 is 3,220,000 t, placing EBS walleye pollock in sub-tier "a" of Tier 1. As in the last two assessments, the maximum permissible ABC harvest rate was based on the ratio between MSY and the equilibrium age 3+ biomass corresponding to MSY. The harmonic mean of this ratio from the present assessment is 0.235, virtually identical to the value obtained in last year's assessment. This ratio is multiplied by the geometric mean of the projected age 3+ biomass for 2006 (8,050,000 t) to obtain the maximum permissible ABC for 2006, which is 1,930,000 t. This ABC is about 3% higher than the 2006 yield corresponding to an  $F_{40\%}$  strategy, which is 1,880,000 t. For the last four years, ABC for this stock has been set at the maximum permissible value. This year, the assessment authors recommend setting ABC at the  $F_{40\%}$  level rather than at the maximum permissible value. However, the results of the present assessment are so similar to last year's assessment, and the maximum permissible ABC is so close (in relative terms) to the value that would be obtained under an  $F_{40\%}$  strategy, that the Plan Team could not find any compelling reason to depart from the approach used to set ABC for the last four years, and so recommends setting the 2006 ABC at the maximum permissible level of 1,930,000 t. The Plan Team notes that future ABCs are likely to decrease as the 2000 year class works its way through the age structure of the population.

Given that TAC will necessarily be set below the recommended ABC due to the OY cap, the assessment also provides alternative harvest scenarios, including the seven standard scenarios analyzed in all age-structured assessments and two constant catch scenarios (1,300,000 t and 1,500,000 t).

The OFL harvest ratio under Tier 1a is 0.254, the arithmetic mean of the ratio between MSY and the equilibrium age 3+ biomass corresponding to MSY. The product of this ratio and the geometric mean of the projected age 3+ biomass for 2006 (8,230,000 t) gives the OFL for 2006, which is 2,090,000 t. The walleye pollock stock in the EBS is not overfished and is not approaching an overfished condition.

This year's assessment includes an expanded "Ecosystems Considerations" section. Results of ecosystem models indicate that the pollock stock exhibits a high level of cannibalism, which tends to stabilize the stock. These models do not indicate that recent levels of pollock harvest are adversely affecting the health of the EBS ecosystem.

#### *Aleutian Islands:*

For many years, the Aleutian Islands pollock stock has lacked an age-structured model and the SSC has determined that the stock qualified for management under Tier 5. Following preliminary exploration of some age-structured models in the 2003 assessment, several models were presented for potential management use in last year's assessment. All models focused primarily on the portion of the stock to the west of 174°W. One also included survey data (but not fishery data) from east of 174°W. However, the SSC felt that adoption of a model was precluded until such time as additional field research results in greater confidence in the stock structure and spatial distribution of pollock in the Aleutian Islands. In this year's assessment, two models from last year's assessment are presented again, one of which (Model 1) uses data only from the portion of the stock to the west of 174°W, and the other of which (Model 2) includes survey data from the entire Aleutian Islands management area. Although the Plan Team feels that the authors have done an excellent job of exploring the available data,

the same ambiguities present in last year's assessment remain. The authors reported that proposals for experimental fishing are presently under discussion. Such experimental fishing may provide an opportunity for the type of field research requested by the SSC and may also facilitate exploration of alternative management systems based on finer spatio-temporal scales. The Plan Team suggests that examination of mean lengths at age across subareas may also lend some insight into stock structure.

Given the results from either model in this year's assessment, continued management under Tier 5 would be a precautionary alternative, because the maximum permissible ABC under Tier 5 is lower than the maximum permissible ABC under Tier 3 for either model. Assuming that the SSC determines that the Aleutian pollock stock qualifies for management only under Tier 5, the Team recommends computing the maximum permissible ABC for 2006 as the product of the most recent (2004) survey biomass estimate (130,000 t) and 75% of the natural mortality rate (0.30), giving a value of 29,400 t. The corresponding 2006 OFL would be 39,100 t. As a Tier 5 stock, it is not possible to determine whether Aleutian pollock is overfished or whether it is approaching an overfished condition.

#### *Bogoslof:*

The 2005 hydroacoustic survey of the Bogoslof region resulted in a biomass estimate of 253,000 t, an increase of about 28% from the 2003 estimate (there was no survey in 2004). Prior to this year, the Bogoslof pollock stock was managed on the basis of the most recent survey biomass estimate. In this year's assessment, however, seven new age-structured models are presented. Based on the authors' recommended model (Model 4), it appears that age 5+ biomass peaked in 1983 at a value of about 5 million t, supported largely by an enormous 1978 year class. The 1978 year class appears to have been more than 5 times larger than any subsequent year class. Following a decline from the 1983 peak, biomass appears to have been fairly stable since about 1992.

The authors have made an excellent start on age-structured modeling of this stock and provide some useful insights into the history of the stock; however, adoption of any of the models would be premature. This is partly because none of the models uses catch data from the "Donut Hole" area. Although the relationship between pollock from the Donut Hole and Bogoslof area is not evident, catches from the Donut Hole were very high during the 1984-1991 period (Table 1b.1). It seems advisable to explore the possible implications of Donut Hole catches before a Bogoslof model is adopted.

Last year, the SSC determined that Bogoslof pollock qualified for management under Tier 5. As with pollock in the Aleutian Islands, continued management of Bogoslof pollock under Tier 5 would be a precautionary alternative, because the maximum permissible ABC under Tier 5 is lower than the maximum permissible ABC under Tier 3 for any of the models presented. The maximum permissible ABC under Tier 5 is 75% of the product of the natural mortality rate (0.20) and biomass, giving a value of 38,000 t, which is the Plan Team's recommendation for 2006 ABC. For several years, the Plan Team has recommended setting ABC for this stock at the maximum permissible level while the SSC has used a much more conservative approach. If the formula used by the SSC is applied, the resulting fishing mortality rate is 0.022, giving a 2006 ABC of 5,500 t.

The overfishing level under Tier 5 is the product of the natural mortality rate and biomass, giving an OFL of 50,600 t for 2006. As a Tier 5 stock, it is not possible to determine whether Bogoslof pollock is overfished or whether it is approaching an overfished condition.

## Pacific Cod

Status and catch specifications (t) of Pacific cod in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
BSAI	2004	1,660,000	350,000	223,000	215,500	203,830
	2005	1,290,000	265,000	206,000	206,000	183,020
	2006	922,000	230,000	194,000	n/a	n/a
	2007	n/a	176,000	148,000	n/a	n/a

The present assessment is a substantial revision of last year's assessment, incorporating new assessment software and a new maturity-at-length schedule. Relative to past assessment software (Model 1), several technical changes were implemented in the new assessment software (Model 2). In addition, the authors explored allowing the model to estimate survey catchability ( $q$ ) and natural mortality ( $M$ ) within the constraints of prior distributions (Model 3). Though the authors recommended Model 3, the Plan Team accepted Model 2. The results for Model 2 are presented below.

This year's EBS shelf bottom trawl survey resulted in a biomass estimate of 604,000 t, nearly the same as the 2004 estimate and near the minimum for the time series (534,000 t). Model estimates of abundance are lower than last year's assessment. Estimated 2006 spawning biomass for the BSAI stock is 283,000 t, down about 4% from last year's estimate for 2005 and down about 2% from last year's  $F_{40\%}$  projection for 2006. Abundance is projected to continue to decrease during 2006-2009 because recent (2001-2004) recruitments are below average.

The SSC has determined that reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock, and that this stock therefore qualifies for management under Tier 3. The updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from the present assessment are 295,000 t, 0.41 and 0.50, respectively. Pacific cod qualify for management under sub-tier "b" of Tier 3 because projected biomass for 2006 (279,000 t) is about 5% below  $B_{40\%}$ . Fishing at an instantaneous rate of 0.39 is projected to result in a 2006 catch of 194,000 t, which is the maximum permissible ABC under Amendment 56.

The Plan Team recommends setting 2006 ABC at the maximum permissible value of 194,000 t, 6% below the 2005 ABC of 206,000 t. The Plan Team's recommended OFL was determined from the Tier 3b formula, where fishing at a rate of 0.47 gives a 2006 value of 230,000 t, down 13% from the 2005 OFL of 265,000 t. Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

A new maturity-at-length schedule was incorporated this year; the new schedule implies that Pacific cod mature earlier than the previous schedule. The new schedule is based on microscopic examination of the ovaries, which detected developing eggs in small cod that the previous macroscopic methods had missed. The new schedule is an improvement. The Plan Team concurs with the authors' decision to incorporate the new schedule into the assessment.

The Plan Team recommends continued research on cod maturity. First, AFSC scientists should continue an existing study of measures of egg viability as a method for determining whether spawning potential per unit body weight is less for smaller fish. This is a concern because, for example, egg diameters in small Atlantic cod are smaller and contain less yolk than egg diameters of large Atlantic cod. Second, AFSC scientists should broaden the geographic coverage of the Bering Sea samples, which were collected from a small (4 X 8 nmi) area near Cape Sarichef during January and March. The limited sampling may not be representative of the population if, for example, only precocious, small cod enter the spawning area.

One benefit of applying the new assessment software was additional flexibility of the selectivity function and the ability to specify prior distributions for selectivity parameters, which reduced the degree of dome-shape of

the shelf trawl survey selectivity compared to the old assessment software. As a result, more large cod were estimated to remain available to the shelf trawl survey. Following the addition of age data in last year's assessment, plus the additional flexibility of the selectivity functions in this year's assessment, the authors have significantly improved the Pacific cod assessment these last two years and reduced some of the uncertainties.

The Plan Team commends the authors for exploring estimation of both natural mortality and survey catchability (Model 3). We recommend that the authors explore estimation of survey catchability in next year's assessment, but leave natural mortality fixed until more age data are available for Pacific cod.

## Sablefish

Status and catch specifications (t) of sablefish in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

<b>Area</b>	<b>Year</b>	<b>Age 4+ Bio.</b>	<b>OFL</b>	<b>ABC</b>	<b>TAC</b>	<b>Catch</b>
EBS	2004	32,000	4,020	3,000	2,900	1,040
	2005	34,000	2,950	2,440	2,440	1,040
	2006	31,000	3,680	3,060	n/a	n/a
	2007	n/a	3,260	2,700	n/a	n/a
AI	2004	39,000	4,620	3,450	3,100	955
	2005	34,000	3,170	2,620	2,620	1,480
	2006	33,000	3,740	3,100	n/a	n/a
	2007	n/a	3,300	2,740	n/a	n/a

Sablefish are assessed as a single stock in the BSAI and GOA. The present assessment is a straightforward update of last year's assessment, which incorporates the following data into the model: relative abundance and length data from the 2005 longline survey, relative abundance and length data from the 2004 longline fishery, and age data from the 2004 longline survey and longline fisheries. Fishery CPUE data from 2004 logbooks were not available due to a delay in data entry; only observer CPUE data for 2004 were used. The rules used to screen commercial CPUE data for whale depredation and targeting on other species were revised to provide a more consistent index. The final dataset showed a good agreement between observer and logbook fishery CPUE. Both the 2004 and 2005 logbook data are expected to be available for next year's assessment.

The survey abundance index decreased 2.5% from 2004 to 2005, following a 1% decrease from 2003 to 2004. These decreases follow recent increases, so that relative abundance in 2005 is 6% higher than in 2000. The fishery abundance index increased 6% from 2003 to 2004 (2005 data are not available yet). The increase returns relative fishery abundance in 2004 to the same level as 2000.

Spawning biomass is projected to remain stable from 2005 to 2006. Sablefish abundance is moderate; projected 2006 spawning biomass is 38% of unfished biomass. Abundance has increased from a low of 33% of unfished biomass during 1998 to 2000. The 1997 and 2000 year classes appear to be important parts of the total biomass and together are projected to account for 38% of 2006 spawning biomass, with each contributing 19% to the 2006 spawning biomass. The 1998 year class, once expected to be strong, appears average.

The SSC has determined that this stock qualifies for management under Tier 3. The updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from this assessment are 211,000 t (combined across the EBS, AI, and GOA), 0.11, and 0.14, respectively. Projected spawning biomass (combined areas) for 2006 is 199,000 t (95% of  $B_{40\%}$ ), placing sablefish in sub-tier "b" of Tier 3. The maximum permissible value of  $F_{ABC}$  under Tier 3b is 0.11, which translates into a 2006 catch (combined areas) of 21,000 t and is the Plan Team's recommended combined 2006 ABC. The recommended 2006 ABC is the same as the 2005 ABC of 21,000 t, which represents a 9% decrease from the 2004 ABC of 23,000 t. Spawning biomass is projected to remain stable from 2005 to 2006, but

decrease slightly in 2007. A 5-year exponential weighting of longline survey relative abundance may be used to apportion the combined 2006 ABC among regions, resulting in the following values: 3,060 t for EBS, 3,100 t for AI, and 14,840 t for GOA. Relative to 2005, apportionments to EBS and AI increased and GOA decreased. This shift in apportionment reflects increases in BSAI indices relative to the GOA.

The risk that maximum permissible ABC will reduce spawning biomass below the replacement level is low. During the next three years, the probability of spawning biomass falling below the estimated threshold of  $B_{18\%}$  is nil. The probability of falling below  $B_{30\%}$  in three years is small (16%). The long-term probability depends on future recruitment, but will be updated each year as new data become available.

The OFL fishing mortality rate under Tier 3b is 0.13. This fishing mortality rate translates into a 2006 OFL (combined areas) of 25,300 t. Using the survey-based apportionment scheme described above, 2006 OFL also may be apportioned among regions and results in the following values: 3,680 t for EBS, 3,740 t for AI, and 17,880 t for GOA.

Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

## Yellowfin Sole

Status and catch specifications (t) of yellowfin sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Area	Year	Age 2+ Bio.	OFL	ABC	TAC	Catch
BSAI	2004	1,560,000	135,000	114,000	86,075	75,367
	2005	1,560,000	148,000	124,000	90,686	91,684
	2006	1,680,000	144,000	121,000	n/a	n/a
	2007	n/a	137,000	116,000	n/a	n/a

The present assessment is a straightforward update of last year's assessment, incorporating new catch and survey information. This year's EBS bottom trawl survey resulted in a biomass estimate of 2,770,000 t, an increase of 9% from last year's survey and the highest estimate in 20 years. There has been a steady increase of approximately 10% in the bottom trawl survey estimate since 1999. The assessment contains an ecosystem component by representing catchability of the EBS shelf trawl survey as an exponential function of average annual bottom temperature during the EBS shelf trawl survey.

Reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock, thereby qualifying yellowfin sole for management under Tier 3. The updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from the present assessment are 412,000 t, 0.11, and 0.14, respectively. Given that the projected 2006 spawning biomass of 485,000 t exceeds  $B_{40\%}$ , the Plan Team's ABC and OFL recommendations for 2006 were calculated under sub-tier "a" of Tier 3. The Plan Team recommends setting FABC at the  $F_{40\%}$  (0.11) level, which is the maximum permissible level under Tier 3a. Projected harvesting at the  $F_{40\%}$  level gives a 2006 ABC of 121,000 t.

The Plan Team's OFL was determined from the Tier 3a formula, where an  $F_{35\%}$  value of 0.14 gives a 2006 OFL of 144,000 t. Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

This stock is predicted to be fairly stable or decrease slightly in the near future due to below average recruitment in the last 5 years. The senior author also noted that this is the largest flatfish fishery in the world.

## Greenland turbot

Status and catch specifications (t) of **Greenland turbot** in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Year	Area	Age 1+ Bio.	OFL	Subarea	ABC	TAC	Catch
2004	BSAI	132,000	19,300	EBS	3,162	2,700	1,805
				AI	1,578	800	410
2005	BSAI	98,300	19,200	EBS	2,720	2,700	2,105
				AI	1,210	800	425
2006	BSAI	74,200	14,200	EBS	1,890	n/a	n/a
				AI	850	n/a	n/a
2007	BSAI			EBS	1,815	n/a	n/a
				AI	815	n/a	n/a

The present assessment is a straightforward update of last year's assessment. This year's model incorporated new catch and length frequency data from the fishery. It also included an updated, aggregated longline survey index and updated trawl survey information on biomass and length frequency data. Biomass and length composition data were also included from the EBS slope and shelf surveys. The assessment model utilized a revised 2004 slope survey biomass estimate and 1985-2004 shelf survey data that included two additional, more northerly survey strata. The SSC has determined that reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock. Updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from the present assessment are 47,400 t, 0.48, and 0.61, respectively. Projected spawning biomass for 2006 is 43,500 t. Greenland turbot therefore qualify for management under Tier 3b. The maximum permissible value of  $F_{ABC}$  under this tier translates into a 2006 catch of 11,400 t.

Greenland turbot continues to be the only flatfish species that remains low in abundance compared to the 1970s. The team discussed possible reasons for continued low abundance of Greenland turbot despite conservative ABCs and low catches, but a definitive answer does not appear possible at this time. Given the magnitude and duration of the decline in Greenland turbot biomass (Figure 5.13), the Plan Team agrees with the authors' recommendation to set the 2006 ABC at a value substantially less than the maximum permissible. The Team opted to continue using  $F_{ABC}$  = 5-year average, which results in a 2006 ABC of 2,740 t corresponding to a full selection fishing mortality rate of 0.095. The OFL fishing mortality rate is computed under Tier 3b,  $F_{OFL}$  = 0.56, and translates into a 2006 OFL of 14,200 t.

## Arrowtooth Flounder

Status and catch specifications (t) of arrowtooth flounder in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Area	Year	Age 1+ Bio.	OFL	ABC	TAC	Catch
BSAI	2004	696,000	142,000	115,000	12,000	18,241
	2005	684,000	132,000	108,000	12,000	13,888
	2006	964,000	166,000	136,000	n/a	n/a
	2007	n/a	174,000	142,000	n/a	n/a

The present assessment is a straightforward update of last year's assessment, incorporating new data from the EBS shelf trawl survey in 2005, and the 2004 and 2005 fisheries. The assessment contains an ecosystem component by representing catchability of the EBS shelf trawl survey as an exponential function of average annual bottom temperature during the EBS shelf trawl survey. This year's EBS shelf bottom trawl survey resulted in a biomass estimate of 758,000 t, the largest estimate observed for this stock.

More female arrowtooth flounder are caught than males during the fisheries and the surveys. As in recent assessments, the model was evaluated using a range of male natural mortality rates between 0.25 and 0.34. Based on the likelihood profiling over a range of natural mortality values for males, a highly likely value for male natural mortality rate is 0.33. As in past assessments, the female natural mortality rate was fixed at 0.20.

The SSC has determined that reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock, thereby qualifying arrowtooth flounder for management under Tier 3. The updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from the present assessment are 295,000 t, 0.26, and 0.32, respectively. Given that the projected 2006 spawning biomass of 667,000 t exceeds  $B_{40\%}$ , the Plan Team's ABC and OFL recommendations for 2006 were calculated under sub-tier "a" of Tier 3. The Plan Team recommends setting FABC at the  $F_{40\%}$  (0.26) level, which is the maximum permissible level under Tier 3a. Projected harvesting at the  $F_{40\%}$  level gives a 2006 ABC of 136,000 t.

The OFL fishing mortality rate under Tier 3a is  $F_{35\%}$  (0.32), translating into a 2006 OFL of 166,000 t. Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

Currently, the arrowtooth flounder fishery is not a directed fishery in the BSAI and continues to have a high discard rate (>60%). The authors also noted that the ABC recommendation is for the combined harvest of arrowtooth flounder and Kamchatka flounder, which are difficult to distinguish and have similar biomass trends from the EBS trawl survey since 1991.

## Northern Rock sole

Status and catch specifications (t) of rock sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Area	Year	Age 2+ Bio	OFL	ABC	TAC	Catch
BSAI	2004	1,170,000	167,000	139,000	38,000	48,661
	2005	1,380,000	157,000	132,000	41,500	37,237
	2006	1,490,000	150,000	126,000	n/a	n/a
	2007	n/a	145,000	122,000	n/a	n/a

The present assessment is a straightforward update of last year's assessment. This assessment acknowledges that two species of rock sole, northern (*Lepidopsetta polyxystra*) and southern (*Lepidopsetta bilineata*) inhabit the Bering Sea. Northern rock sole are dominant (2% of the commercial catch is estimated to be southern rock sole). Assessments prior to 2005 used combined data for the two species of rock sole. However data for the 2006 assessment is for northern rock sole only. No attempt was made to correct past catch or survey data by species.

Changes to input data in this analysis include addition of 2004 rock sole fishery age composition, 2004 northern rock sole survey age composition, and 2005 northern rock sole trawl survey biomass point estimate and standard error, and 2005 catch data. Only Bering Sea survey data (no Aleutian Islands data, 3% of total rock sole) were used in calculations. Another change to the input data was inclusion of an estimate of retained and discarded portions of the 2004 rock sole catches.

As in recent assessments this analysis included an estimate of natural mortality; an M of 0.16, corresponding to M of 0.1612 used in 2004. As last year, this value produced the best model fit to the observed data. As explained



in 2003 and affirmed in 2004, the authors investigated catchability ( $q$ ) and concluded that temperature does not affect survey catchability.

This year's EBS bottom trawl survey resulted in a biomass estimate of 1,489,000 t, compared to last year's estimate of 1,376,000 t, an increase of 8% over the biomass estimate in 2004. Despite this, as several other flatfish stocks, the rock sole stock is expected to decline due to the low recruitment in the last decade. However, good recruitment in 2001 and 2002 should increase the stock biomass at the beginning of the next decade.

The SSC has determined that reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock, and therefore it is qualified for management under Tier 3 of the BSAI Groundfish FMP. The updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from the present assessment are 228,000 t, 0.15, and 0.18, respectively. Given that the projected 2006 spawning biomass of 400,000 t exceeds  $B_{40\%}$ , the ABC and OFL recommendations for 2006 were calculated under sub-tier "a" of Tier 3. The Plan Team recommends setting  $F_{ABC}$  at the  $F_{40\%}$  ( $=0.15$ ) level, which is the maximum permissible level under Tier 3a. Projected harvesting at the  $F_{40\%}$  level gives a 2006 ABC of 126,000 t.

OFL was determined from the Tier 3a formula, where an  $F_{35\%}$  value of 0.18 gives a 2006 OFL of 150,000 t. Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

This is a stable fishery that is lightly exploited because it is constrained by prohibited species catch limits and the BSAI optimum yield limit. In 2005, the total catch was approximately the same as the total TAC. In mid-August the Pacific halibut cap was met, limiting the catch for all flatfish stocks.

An item of ecosystem concern is that the rock sole fishery accounts for 68% of crab bycatch (40% of red king crab, 19% of *C. bairdi* and 9% of other Tanner crabs). The bycatch can be attributed to the timing and location of the rock sole roe fishery.

## Flathead Sole

Status and catch specifications (t) of flathead sole in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
BSAI	2004	505,000	75,200	61,900	19,000	17,407
	2005	560,000	70,200	58,500	19,500	15,818
	2006	636,000	71,800	59,800	n/a	n/a
	2007	n/a	67,900	56,600	n/a	n/a

The present assessment is a straightforward update of last year's assessment. The present assessment includes updated catch, survey biomass, length composition, and age composition data. This year's survey biomass was 620,000, a 2% decrease from 2004. This year's assessment again examined the relationship between bottom temperature and the trawl survey catchability coefficient. This addition has affected model estimates of survey biomass estimates since 1998, during which time temperature fluctuations were relatively large.

The SSC has determined that reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock, thereby qualifying the stock for management under Tier 3. The updated point estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  from the present assessment are 124,000, 0.30, and 0.36, respectively. Given that the projected 2006 spawning biomass of 234,000 t exceeds  $B_{40\%}$ , the ABC and OFL recommendations for 2006 were calculated under sub-tier "a" of Tier 3. The Plan Team recommends setting  $F_{ABC}$  at the  $F_{40\%}$  (0.30) level, which is the maximum permissible level under Tier 3a. Projected harvesting at the  $F_{40\%}$  level gives a 2006 ABC of 59,800 t. The OFL was determined from the Tier 3a formula, where an  $F_{35\%}$  value of 0.37 gives a 2006 OFL of 71,800 t.

Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

While a Ricker stock-recruit model fit the post-1976 data reasonably well, it was unclear whether this was a coincidental effect of a 1989 regime shift. Because of this uncertainty, the Plan Team agrees with the authors in recommending that the results of the stock-recruit model not be used for managing flathead sole at this time.

## Alaska plaice

Status and catch specifications (t) of Alaska plaice in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05

Area	Year	Age 3 + Bio.	OFL	ABC	TAC	Catch
BSAI	2004	1,060,000	258,000	203,000	9,250	7,570
	2005	913,000	237,000	189,000	8,000	11,183
	2006	1,008,000	237,000	188,000	n/a	n/a
	2007		231,000	183,000		

The present assessment is a straightforward update of last year's assessment. There were only minor changes in this year's assessment methodology and input data. Input data were updated with 2004 catch data and inclusion of 2005 fishery catch. The 2005 trawl survey biomass estimate and standard error, and 2005 length composition of survey catch also were added to the model. The model could benefit by the input of new age data for Alaska plaice. Otolith samples have been routinely collected, but not analyzed since 2002.

No relationship between survey catchability and bottom temperature was found for Alaska plaice.

Reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock; therefore qualifying it for management under Tier 3a of the BSAI Groundfish FMP. The updated point estimates are  $B_{40\%} = 148,000$  t,  $F_{40\%} = 0.77$ ,  $F_{35\%} = 1.08$ . These are high values for flatfishes, but these values are the consequence of Alaska plaice maturing before recruiting to the fishery. Given that the projected 2005 spawning biomass of 208,000 t exceeds  $B_{40\%}$ , the ABC and OFL recommendations for 2006 were calculated under sub-tier "a" of Tier 3. Projected harvesting at the  $F_{40\%}$  level gives a 2006 ABC of 188,000 t. The OFL was determined from the Tier 3a formula, where, an  $F_{35\%}$  value (1.08) gives a 2006 OFL of 237,000 t. The sensitivity of the spawning-per-recruit fishing reference point to the change in fishing selectivity is not unexpected, given that the age at 50% maturity is approximately 8.5 and the natural mortality rate (0.25) is relatively high compared to other flatfishes. Because the age at 50% selection in the fishery is 10.9, Alaska plaice has the potential to spawn twice before it recruits to the fishery. Additionally, the high natural mortality of 0.25 indicates that the lifetime spawning/recruit potential is rapidly reducing at the ages of highest fishing selectivity. There continues to be relatively stable recruitment of Alaska plaice from the late 1970s through the present.

Model projections indicate that this species is neither overfished nor approaching an overfished condition.

## Other flatfish complex

Status and catch specifications (t) of other flatfish in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

	Year	Total Bio.	OFL	ABC	TAC	Catch
BSAI	2004	90,330	18,070	13,550	2,775	4,874
	2005	143,000	28,500	21,400	3,500	4,466
	2006	121,000	24,200	18,100	n/a	n/a
	2007	24,200	18,100	n/a	n/a	

With the removal of Alaska plaice from this category in 2002, the species currently collected in the "other flatfish" category in the Eastern Bering Sea survey are Arctic flounder, butter sole, curlfin sole, deepsea sole, Dover sole, English sole, longhead dab, Pacific sand dab, petrale sole, rex sole, roughscale sole, sand sole, slender sole, starry flounder, and Sakhalin sole. The species currently collected in the "other flatfish" category in the Aleutian Islands

survey are Dover sole, rex sole, starry flounder, butter sole and English sole. Starry flounder, rex sole and butter sole comprise the majority of the species caught with a negligible amount of other species. Of those, starry flounder and rex sole comprised 90% of the other flatfish catch in 2005.

The present assessment is a straightforward update of last year's assessment. Insufficient information about these species makes model analysis impossible. The assessment incorporates 2004 total catch and discard; catch through 29 October 2005 and 2005 trawl survey information. The 2005 EBS bottom trawl surveys resulted in a biomass estimate of 121,000 t, a decrease from 143,000 t of the 2004 survey.

With the removal of Alaska plaice from this category in 2002 the SSC reclassified "other flatfish" as a Tier 5 species complex with an assumed natural mortality rate of 0.20. Projected harvesting at the 0.75 *M* level ( $F_{ABC} = 0.15$ ), gives a 2006 ABC of 18,100 t for the "other flatfish" species. The corresponding 2006 OFL (=0.20) is of 24,100 t. It is not possible to determine whether the "other flatfish" complex is overfished or approaching an overfished condition because it is not managed under Tiers 1-3.

This group of fisheries is usually closed prior to attainment of TAC because of the bycatch of Pacific halibut, a prohibited species. The "other flatfish" complex catch (4,466) exceeded the TAC (3,500) by 40% in 2005; however the TAC was set much lower than the ABC thus this is not a biological concern. Proportionally more butter sole are caught in the fishery than in the trawl survey. This species is at the northern extent of its range.

## Pacific Ocean Perch (POP)

Status and catch specifications (t) of <b>Pacific ocean perch</b> . Biomass corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.							
Year	Area	Age 3+ Bio	OFL	Subarea	ABC	TAC	Catch
2004	BSAI	349,000	15,800		13,300	12,220	11,883
				EBS	2,128	1,048	718
				Eastern AI	3,059	3,059	2,536
				Central AI	2,926	2,926	3,143
				Western AI	5,187	5,187	5,486
2005	BSAI	379,000	17,300		14,600	12,600	10,360
				EBS	2,920	1,400	811
				Eastern AI	3,212	3,080	2,586
				Central AI	3,165	3,035	2,238
				Western AI	5,303	5,085	4,725
2006	BSAI	385,240	17,600		14,800	n/a	n/a
				EBS	2,960	n/a	n/a
				Eastern AI	3,256	n/a	n/a
				Central AI	3,212	n/a	n/a
				Western AI	5,372	n/a	n/a
2007	BSAI		17,600		14,800		
				EBS	2,960	n/a	n/a
				Eastern AI	3,256	n/a	n/a
				Central AI	3,212	n/a	n/a
				Western AI	5,372	n/a	n/a

Beginning this year POP assessments will be conducted on a 2-year cycle. There is no new survey for 2005. Consequently, updated catch data are the only new data incorporated into this year's POP assessment. This assessment is essentially the same as the assessment from the previous year, with minor changes due to the addition of new catch data.

The SSC has determined that reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock, thereby qualifying Pacific ocean perch for management under Tier 3. The current estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  are 142,000 t, 0.048, and 0.058 respectively. Given that projected spawning biomass of 133,000 t is below  $B_{40\%}$ , the Plan Team's ABC and OFL recommendations were calculated under sub-tier "b". The Plan Team recommends setting  $F_{ABC}$  at the adjusted  $F_{40\%}$  (0.045) and  $F_{OFL}$  at the adjusted  $F_{35\%}$  of 0.054. This gives an ABC of 14,800 t, which is the author's and Plan Team's recommendation. The team concurs with the author's recommendation that ABCs be set regionally based on the proportions in combined survey biomass as follows: BS = 2,960 t, Eastern Aleutians (Area 541) = 3,260 t, Central Aleutians (Area 542) = 3,210 t, Western Aleutians (Area 543) = 5,380 t. The OFL fishing mortality rate is computed under Tier 3b as 17,600 t, which is the author's and Plan Team's recommended OFL for the BSAI. The OFL for BSAI is not regionally apportioned. For 2007, the recommended ABC is 14,800 t, and the OFL is 17,600t.

The authors presented an Appendix with the results of an SSC-recommended analysis on the management consequences of maternal effect on fecundity and implications for stock productivity. Among the results, the authors found that the reduced effectiveness of younger spawners resulting in reduced reproductive output conserved for a given fishing mortality tended to be counteracted by the increased resiliency in stock recruitment relationships due to an equivalent number of recruits associated with reduced reproductive output.

Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

### Northern Rockfish

Status and catch specifications (t) of Northern rockfish. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch is reported through 10/29/05.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
BSAI	2004	142,000	8,140	6,880	5,000	4,683
	2005	200,000	9,810	8,260	5,000	3,959
	2006	204,000	10,100	8,530	n/a	n/a
	2007	n/a	9,890	8,320	n/a	n/a

The methodology in this year's assessment was the same as last year, with updated catch data for 2004 and 2005. The SSC has determined that this stock qualifies for management under Tier 3 due to the availability of reliable estimates for  $B_{40\%}$  (46,000 t),  $F_{40\%}$  (0.049), and  $F_{35\%}$  (0.059). Since the female spawning biomass of 66,800 is greater than  $B_{40\%}$ , sub-tier "a" would be applicable, with  $F_{ABC} = F_{40\%}$  and  $F_{OFL} = F_{35\%}$ . Under Tier 3a, the maximum permissible ABC is 8,530 t, which is the authors' and Plan Team's recommendation for the 2006 ABC. Under Tier 3a, the 2006 OFL is 10,100 t for the Bering Sea/Aleutian Islands combined. The Plan Team recommends setting a combined BSAI OFL and ABC due to the difficulty of managing low quotas (<50 t) which would result from subregional splitting.

Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

### Shortraker/Rougheye Rockfish

Status and catch specifications (t) of shortraker/rougheye in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

<b>Species</b>	<b>Area</b>	<b>Year</b>	<b>Survey Bio.</b>	<b>OFL</b>	<b>ABC</b>	<b>TAC</b>	<b>Catch</b>
shortraker	BSAI	2004	23,400	701	526	526	241
		2005	26,500	794	596	596	166
		2006	25,800	774	580	n/a	n/a
		2007	n/a	774	580	n/a	n/a
rougheye	BSAI	2004	10,400	259	195	195	208
		2005	11,900	298	223	223	92
		2006	11,900	299	224	n/a	n/a
		2007	n/a	299	224	n/a	n/a

The assessment methodology used is a straightforward update of last year's assessment. The SSC has previously determined that reliable estimates of biomass and natural mortality exist for shortraker and rougheye rockfish, qualifying the species for management under Tier 5. At the present time, the Plan Team recommends that the SSC retain Tier 5 management for these stocks. The Plan Team recommends setting  $F_{ABC}$  at the maximum permissible level under Tier 5, which is 75% of  $M$ . Accepted values for  $M$  for these stocks are: rougheye rockfish--0.025, shortraker rockfish--0.030, resulting in  $F_{ABC}$  values of 0.019 and 0.023 for rougheye and shortraker, respectively.

In 2001, the Plan Team, SSC, AP, and Council recommended separating shortraker and rougheye rockfish species and setting BSAI area-wide ABCs and TACs for 2002. However, NMFS was unable to implement those recommendations because of the difficulty of species identification, and instead set separate BS and AI TACs for the combined shortraker/rougheye rockfishes category. In 2004, the NMFS Regional Office and Observer Program developed a catch accounting program that separates shortraker and rougheye rockfishes. With this improvement, concerns over management of small OFLs led to recombining regions into a BSAI-wide quota for each species.

For 2006 ABC and OFL, the authors presented separate BS and AI recommendations. Per SSC request, the authors summarized existing genetic analyses. These suggest that the BS and AI represent separate spawning populations for rougheye rockfish, although the results are unclear for shortraker rockfish due to lack of sampling in the Bering Sea. The Plan Team also discussed potential management complications that might arise from area-specific quotas for these species. Given the information available, the Plan Team could not reach consensus on whether to split ABC or OFL by region. At this point, the primary data gaps are less related to biology than to the distribution of fishery catches by area/target and the ability of the management system to deal with very small, area-specific TACs. The Plan Team therefore requests that the authors present additional information on the distribution of fishery catches at the September 2006 Plan Team meeting. In the interim, the Plan Team recommends retaining BSAI-wide ABCs and OFLs for the two species.

The biomass estimates for 2006 are 25,800 t for shortraker rockfish and 11,900 t for rougheye rockfish, leading to BSAI OFLs of 774 t for shortraker and 299 t for rougheye, and ABCs of 580 t for shortraker and 224 t for rougheye. It is not possible to determine whether these species are overfished or whether they are approaching an overfished condition because they are managed under Tier 5.

### Other Rockfish Complex

Status and catch specifications (t) of other rockfish (primarily thornyheads) in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

Year	Area	Subarea	Survey Bio.	OFL	ABC	TAC	Catch
2004	BSAI						
		BS	18,300	1,280	960	960	317
		AI	12,100	846	634	634	337
2005	BSAI		26,600	1,870			
		BS	15,400		810	460	188
		AI	11,200		590	590	280
2006	BSAI		n/a	1,870			
		BS	n/a		810	n/a	n/a
		AI	n/a		590	n/a	n/a
2007	BSAI		n/a	1,870			
		BS	n/a		810	n/a	n/a
		AI	n/a		590	n/a	n/a

The BSAI “other rockfish” assessment considers the 8 species that have been caught at least once during AFSC research surveys or appeared in more than 1% of observed fishery hauls between 1990 and 2001. Beginning this year, assessments for “other rockfish” will be conducted on a 2-year cycle. There are no new survey data for 2005. Consequently, the ABCs and OFLs for this year’s assessment remain unchanged from last year. Updated catch data for 2004 and 2005 are included in the assessment.

The Plan Team recommends setting  $F_{ABC}$  at the maximum value allowable under Tier 5, which is 75% of  $M$  (0.07), or 0.053. Multiplying this rate by the best estimates of “other rockfish” biomass yields 2006 ABCs of 810 t in the EBS and 590 t in the AI. The Plan Team recommends that OFL be set for the entire BSAI area, which under Tier 5 is calculated by multiplying the best estimate of total biomass for the area by  $M$  (0.07), yielding an OFL of 1,870 t.

### Atka mackerel

Status and catch specifications (t) of Atka mackerel in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data for 2005 are current through 10/29/05.

Area	Year	Age 3+ Bio.	OFL	ABC	TAC	Catch
BSAI	2004	286,000	78,500	66,700	63,000	60,482
	2005	486,000	147,000	124,000	63,000	61,958
	2006	446,000	130,000	110,000	n/a	n/a
	2007	n/a	107,000	91,000	n/a	n/a

The present assessment is a straightforward update of last year’s assessment that utilized the AMAK program in the NMFS Stock Assessment Toolbox. New data include catch updates, 2004 fishery age composition, and 2004 Aleutian Islands survey age composition.

The SSC has determined that reliable estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  exist for this stock, thereby qualifying Atka mackerel for management under Tier 3. The current estimates of  $B_{40\%}$ ,  $F_{40\%}$ , and  $F_{35\%}$  are 95,900 t, 0.44, and 0.53, respectively. Projected spawning biomass for 2006 is 155,800 t, placing Atka mackerel in sub-tier “a” of Tier 3. The assessment authors recommend setting  $F_{ABC}$  at the maximum permissible level, which would give

a 2006 ABC of 110,000 t. The Plan Team agrees with the authors' recommendation. The OFL was determined from the Tier 3a formula, where an  $F_{35\%}$  value of 0.53 gives a 2006 OFL of 130,000 t. Model projections indicate that this stock is neither overfished nor approaching an overfished condition.

To apportion ABCs among areas, the authors used a weighted average of the 4 most recent survey estimates of the biomass distribution, where the greatest weight is assigned to the most recent (2004) survey. When applied to the recommended ABC of 110,000 t, this formula gives the following subarea-specific ABCs: Eastern Bering Sea and Eastern Aleutians = 21,780 t (19.8%), Central Aleutians = 46,860 t (42.6%), and Western Aleutians = 41,360 t (37.6%).

The Plan Team noted that trawl survey biomass estimates have increased for the last three surveys with four back-to-back years of above-average recruitment (1998-2001 year classes).

The authors presented an extensive analysis of Atka mackerel predators and prey, highlighting the major components of predation on Atka mackerel, primarily Pacific cod (25%) and Steller sea lions (16%). Fishing accounts for 21% of the mortality on Atka mackerel.

### Squid and Other Species Complex

Status and catch specifications (t) of squid and other species in recent years. Biomass for each year corresponds to the projection given in the SAFE report issued in the preceding year. The OFL and ABC for 2006 and 2007 are those recommended by the Plan Team. Catch data are current through 10/29/05.

<b>Squid</b>	<b>Area</b>	<b>Year</b>	<b>Biomass</b>	<b>OFL</b>	<b>ABC</b>	<b>TAC</b>	<b>Catch</b>
	BSAI	2004	n/a	2,620	1,970	1,970	1,013
		2005	n/a	2,620	1,970	1,275	1,183
		2006	n/a	2,620	1,970	n/a	n/a
		2007	n/a	2,620	1,970	n/a	n/a
<b>Other species</b>	<b>Area</b>	<b>Year</b>	<b>Survey Bio.</b>	<b>OFL</b>	<b>ABC</b>	<b>TAC</b>	<b>Catch</b>
	BSAI Council Approved	2004	733,000	81,100	46,810	27,205	29,544
		2005	708,000	87,920	53,860	29,000	24,666
	Plan Team Recommendation:	sharks	17,700	1,590	1,190	n/a	383
		skates	478,000	47,800	35,800	n/a	20,290
		sculpins	206,000	39,200	29,400	n/a	5,225
		octopus	6,300	3,160	2,370	n/a	325
		<b>2005: Total</b>	<b>708,000</b>	<b>91,750</b>	<b>68,770</b>	<b>n/a</b>	<b>26,222</b>
		sharks	17,700	1,590	1,190	n/a	n/a
		skates	492,000	49,200	36,900	n/a	n/a
		sculpins	207,000	39,300	29,500	n/a	n/a
		octopus	7,000	3,710	2,780	n/a	n/a
		<b>2006: Total</b>	<b>723,700</b>	<b>93,800</b>	<b>70,370</b>	<b>n/a</b>	<b>n/a</b>
		sharks	17,700	1,590	1,190	n/a	n/a
		skates	492,000	49,200	36,900	n/a	n/a
		sculpins	207,000	39,300	29,500	n/a	n/a
		octopus	7,000	3,710	2,780	n/a	n/a
		<b>2007: Total</b>	<b>723,700</b>	<b>93,800</b>	<b>70,370</b>	<b>n/a</b>	<b>n/a</b>

The Plan Team recommends a 2006 OFL equal to 2,620 t, based on average catch from 1978 through 1995 and an ABC equal to 1,970 t, the maximum permissible. It is not possible to determine whether the squid complex is overfished or whether it is approaching an overfished condition because it is managed under Tier 6.

The Plan Team recommends Tier 5 for each of the four component groups in the 'other species' complex. The Team recommends that the natural mortality rates for sharks, skates, sculpins and octopus be estimated at values

**Table 1. Bering Sea Aleutian Islands Groundfish Plan Team OFL, ABC, and TAC Recommendations for the 2006-2007 Fisheries**

Species	Area	2005				2006				2007			
		OFL	ABC	TAC	Catch**	OFL	ABC	TAC		OFL	ABC	TAC	
Pollock	EBS	2,100,000	1,960,000	1,478,500	1,483,096	2,090,000	1,930,000			1,930,000			
	Aleutian Islands	39,100	29,400	19,000	1,621	39,100	29,400			39,100			
	Bogoslof District	39,600	2,570	10	0	50,600	38,000			50,600			
Pacific cod	BSAI	265,000	206,000	206,000	183,020	230,000	194,000			176,000			
Sablefish	BS	2,950	2,440	2,440	1,037	3,680	3,060			3,260			
	AI	3,170	2,620	2,620	1,480	3,740	3,100			3,300			
Yellowfin sole	BSAI	148,000	124,000	90,686	91,684	144,000	121,000			137,000			
Greenland turbot	Total	19,200	3,930	3,500	2,530	14,200	2,740			13,400			
	BS		2,720	2,700	2,105		1,890						
	AI		1,210	800	425		850						
Arrowtooth flounder	BSAI	132,000	108,000	12,000	13,888	166,000	136,000			174,000			
Northern rock sole	BSAI	157,000	132,000	41,500	37,237	150,000	126,000			145,000			
Flathead sole	BSAI	70,200	58,500	19,500	15,818	71,800	59,800			67,900			
Alaska plaice	BSAI	237,000	189,000	8,000	11,183	237,000	188,000			231,000			
Other flatfish	BSAI	28,500	21,400	3,500	4,466	24,200	18,100			24,200			
Pacific Ocean perch	BSAI	17,300	14,600	12,600	10,360	17,600	14,800			17,600			
	BS		2,920	1,400	811		2,960						
	AI total		11,680	11,200	9,549		11,840						
	WAI		5,305	5,085	4,725		5,372						
	CAI		3,165	3,035	2,238		3,212						
	EAI		3,210	3,080	2,586		3,256						
Northern rockfish	BSAI	9,810	8,260	5,000	3,959	10,100	8,530			9,890			
Shortraker	BSAI	794	596	596	166	774	580			774			
Roughye	BSAI	298	223	223	92	299	224			299			
Other rockfish	BSAI	1,870	1,400	1,050	468	1,870	1,400			1,870			
	BS		810	460	188		810						
	AI		590	590	280		590						
Atka mackerel	Total	147,000	124,000	63,000	61,958	130,000	110,000			107,000			
	WAI		46,620	20,000	19,736		41,360						
	CAI		52,830	35,500	35,105		46,860						
	EAI/BS		24,550	7,500	7,133		21,780						
Squid	BSAI	2,620	1,970	1,275	1,183	2,620	1,970			2,620			
Other species	BSAI	87,920	53,860	29,000	24,666	93,800	70,400			93,800			
	Sharks					1,590	1,190			1,590			
	Skates					49,200	36,900			49,200			
	Sculpins					39,300	29,500			39,300			
Octopus						3,710	2,780			3,710			
Total	BSAI	3,509,332	3,044,769	2,000,000	1,949,912	3,481,383	3,057,104			3,228,613			

\*\*2005 catch is through October 29, 2005 (includes CDQ).



Table 2. Groundfish catches (metric tons) in the eastern Bering Sea, 1954-2005.

Year	Pollock	Pacific Cod	Sable Fish		Yellow Fin Sole		Greenland Turbot	Arrow Tooth Flounder/a		Rock Sole/c	Other Flat Fish		Alaska Plaice		Pacific Ocean Perch/Complex/b		Northern Rockfish	Shorrtaker Rockfish	Roughye Rockfish	Other Rock Fish		Atka Mackerel	Squid	Other Species	Total (All Species)
			Pacific	Cod	Sable	Fish		Fin	Sole		Alaska	Plaice	Ocean Perch	Complex/b	Rock	Flat Fish				Alaska	Plaice				
1954						12,562																		12,562	
1955						14,690																		14,690	
1956						24,697																		24,697	
1957						24,145																		24,145	
1958	6,924	171	6	44,153																			147	51,401	
1959	32,793	2,864	289	185,321																			380	221,647	
1960			1,861	456,103	36,843											6,100								500,907	
1961			15,627	553,742	57,348											47,000								673,717	
1962			25,989	420,703	58,226											19,900								524,818	
1963			13,706	85,810	31,565											24,500								191,224	
1964	174,792	13,408	3,545	111,177	33,729											25,900								393,891	
1965	230,551	14,719	4,838	53,810	9,747											16,800						736		344,369	
1966	261,678	18,200	9,505	102,353	13,042											20,200						2,239		452,081	
1967	550,362	32,064	11,698	162,228	23,869											19,600						4,378		836,308	
1968	702,181	57,902	4,374	84,189	35,232											31,500						22,058		1,192,020	
1969	862,789	50,351	16,009	167,134	36,029											14,500						10,459		1,593,649	
1970	1,256,565	70,094	11,737	133,079	19,691											9,900						15,295		2,137,326	
1971	1,743,763	43,054	15,106	160,399	40,464											9,800						13,496		2,149,092	
1972	1,874,534	42,905	12,758	47,856	64,510											5,700						10,893		2,064,444	
1973	1,758,919	53,386	5,957	78,240	55,280											3,700						55,826		1,900,092	
1974	1,588,390	62,462	4,258	42,235	69,654											14,000						60,263		1,645,232	
1975	1,356,736	51,551	2,766	64,690	64,819											8,600						54,845		1,428,565	
1976	1,177,822	50,481	2,923	56,221	60,523											14,900						26,143		1,168,144	
1977	978,370	33,335	2,718	58,373	27,708											2,654						311		1,302,509	
1978	979,431	42,543	1,192	138,433	37,423											2,221						2,614		1,159,547	
1979	913,881	33,761	1,376	99,017	34,998											1,723						2,108		1,221,944	
1980	958,279	45,861	2,206	87,391	48,856											1,097						459		1,259,666	
1981	973,505	51,996	2,604	97,301	52,921											1,222						356		1,211,483	
1982	955,964	55,040	3,184	95,712	45,805											224						276		1,280,285	
1983	982,363	83,212	2,695	108,385	43,443											221						220		1,458,299	
1984	1,098,783	110,944	2,329	159,526	21,317											1,569						176		1,649,109	
1985	1,179,759	132,736	2,348	227,107	14,698											784						92		1,633,911	
1986	1,188,449	130,555	3,518	208,597	7,710											560						102		1,639,121	
1987	1,237,597	144,539	4,178	181,429	6,533											930						474		1,810,470	
1988	1,228,000	192,726	3,193	223,156	6,064											1,047						341		1,630,382	
1989	1,230,000	164,800	1,252	153,165	4,061											2,017						192		1,644,109	
1990	1,353,000	162,927	2,329	80,584	7,267											5,639						384		1,647,455	
1991	1,268,360	165,444	1,128	94,755	3,704											4,744						396		1,831,954	
1992	1,384,376	163,240	558	146,942	1,875											3,309						675		1,674,406	
1993	1,301,574	133,156	669	105,809	6,330											3,763						190		1,818,628	
1994	1,362,694	174,151	699	144,544	7,211											1,907						261		1,745,890	
1995	1,264,578	228,496	929	124,746	5,855											1,210						629		1,653,355	
1996	1,189,296	209,201	629	129,509	4,699											2,635						364		1,640,590	
1997	1,115,268	209,475	547	166,681	6,589											1,060						161		1,486,739	
1998	1,101,428	160,681	586	101,310	8,303											1,134						203		1,200,387	
1999	889,589	134,647	646	67,307	5,205											609						135		1,497,520	
2000	1,132,736	151,372	742	84,057	5,888											704						239		1,694,677	
2001	1,387,452	142,452	863	63,563	4,252											1,148						296		1,839,170	
2002	1,481,815	166,552	1,143	74,956	3,150											858						401		1,871,273	
2003	1,492,039	180,592	1,039	81,050	2,565											1,391						336		1,877,389	
2004	1,481,678	184,961	1,037	75,358	1,805											7,874						317		1,849,054	
2005/d	1,483,096	160,922	1,037	91,682	2,105											11,175						188		1,877,389	
																10,118						24		1,849,054	
																7,874						14		1,849,054	
																11,175						14		1,849,054	
																11,175						14		1,849,054	
																11,175						14		1,849,054	
																11,175						14		1,849,054	
																11,175						14		1,849,054	
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																11,175						14		1,849,054	
																11,175						14		1,849,054	
																11,175						14		1,849,054	
																11,175						14		1,849,054	
																11,175						14		1,849	

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1960-69.

b/ Includes POP, shortraker, roughye, northern and sharpchin.

c/ Rocksole prior to 1991 is included in other flatfish catch statistics.

d/ Data through October 29, 2005.

Note: Numbers don't include fish taken for research.

Table 3. Groundfish catches (metric tons) in the Aleutian Islands, 1954-2005.

Year	Yellow										Arrow			Other		Pacific				Other		Total (All Species)
	Pollock	Pacific Cod	Sable Fish	Fin Sole	Greenland Turbot	Flounder/a	Tooth Sole/c	Rock Fish	Flat Fish	Alaska Plate	Ocean Perch Complex/b	Northern Rockfish	Shortraker Rockfish	Roughye Rockfish	Rock Fish	Atka Mackerel	Squid	Other Species				
1954																				0		
1955																				0		
1956																				0		
1957																				0		
1958																				0		
1959																				0		
1960																				0		
1961																				0		
1962											200									200		
1963			664		7						20,800								66	21,471		
1964		241	1,541		504						90,300								768	92,652		
1965		451	1,249		300						109,100								131	111,868		
1966		154	1,341		63						85,900								8,542	87,589		
1967		293	1,652		394						55,900								8,948	66,781		
1968		289	1,673		213						44,900								3,088	56,023		
1969		220	1,673		228						38,800								10,671	44,009		
1970		283	1,248		285		274				66,900					949			2,973	80,610		
1971		2,078	2,936		1,750		581				21,800								22,447	32,118		
1972		435	3,531		12,874		1,323				33,200					5,907			2,973	79,717		
1973		977	2,902		8,666		3,705				11,800					1,712			4,244	34,006		
1974		1,379	2,477		8,788		3,195				22,400					1,377			9,724	49,340		
1975		2,838	1,747		2,970		784				16,600					13,326			8,288	46,553		
1976		4,190	1,659		2,067		1,370				14,000					13,126			7,053	43,465		
1977	7,625	3,262	1,897		2,453		2,035				8,080				3,043	20,975	1,808		16,170	67,348		
1978	6,282	3,295	821		4,766		1,782				5,286				921	23,418	2,085		12,436	61,092		
1979	9,504	5,593	782		6,411		6,436				5,487				4,517	21,279	2,252		12,934	75,195		
1980	58,156	5,788	274		3,697		4,603				4,700				420	15,533	2,332		13,028	108,531		
1981	55,516	10,462	533		4,400		3,640				3,622				328	16,661	1,763		7,274	104,199		
1982	57,978	1,526	955		6,317		2,415				1,014				2,114	19,546	1,201		5,167	98,233		
1983	59,026	9,955	673		4,115		3,753				280				1,045	11,585	510		3,675	94,617		
1984	81,834	22,216	999		1,803		1,472				631				56	35,998	343		1,670	147,022		
1985	58,730	12,690	1,448		33		87				308				99	37,856	9		2,050	113,310		
1986	46,641	10,332	3,028		2,154		142				286				169	31,978	20		1,509	96,259		
1987	28,720	13,207	3,834		3,066		159				1,004				147	30,049	23		1,155	81,364		
1988	43,000	5,165	3,415		1,044		406				1,979				278	21,656	3		437	77,383		
1989	156,000	4,118	3,248		4,761		198				2,706				481	14,868	6		108	186,494		
1990	73,000	8,081	2,116		2,353		1,459				14,650				864	21,725	11		627	124,886		
1991	78,104	6,714	2,071	1,380	3,174		938				2,545				549	22,258	30		91	117,942		
1992	54,036	42,889	1,546	4	895		900	236			10,277				3,689	46,831	61		3,081	164,513		
1993	57,184	34,234	2,078	0	2,138		1,348	318	59		13,375				495	65,805	85		2,540	179,659		
1994	58,708	22,421	1,771	0	3,168		1,334	308	55		16,959				301	69,401	86		1,102	175,614		
1995	64,925	16,534	1,119	6	2,338		1,001	356	47		14,734				220	81,214	95		1,273	183,862		
1996	28,933	31,389	720	654	1,677		1,330	371	61		20,443				278	103,087	87		1,720	190,750		
1997	26,872	25,166	779	234	1,077		1,071	271	39		15,687				307	65,668	323		1,555	139,049		
1998	23,821	34,964	595	5	821		694	446	54		13,729				385	56,195	25		2,448	134,182		
1999	965	27,714	565	13	422		746	577	53		17,619				630	51,636	9		1,633	102,582		
2000	1,244	39,684	1,048	13	1,086		1,157	480	113		14,893				601	46,990	8		3,010	110,327		
2001	824	34,207	1,074	15	1,060		1,220	526	97		15,587				610	61,296	5		4,029	120,550		
2002	1,177	30,801	1,118	29	485		1,032	1,165	150		14,996				551	44,722	10		1,980	98,216		
2003	1,653	32,459	1,119	0	998		989	977	81	0	18,765				412	52,988	36		1,414	111,891		
2004	1,172	28,869	955	9	414		805	816	70	0					337	53,403	14		1,850	104,751		
2005/c	1,621	22,098	1,480	2	425		821	546	59	0					280	58,463	17		1,253	100,600		

a/ Arrowtooth flounder included in Greenland turbot catch statistics, 1964-69.

b/ Includes POP shortraker, roughye, northern and sharpchin rockfish until 2004.

c/ Data through October 29, 2005.

Note: Numbers don't include fish taken for research.

Table 4. Groundfish catches (metric tons) in the Bering Sea and Aleutian Islands, 1954-2005.

Year	Pollock		Pacific Cod	Sable Fish	Yellow Fin Sole		Greenland Turbot	Flounder/a	Arrow Tooth Sole/c	Rock Sole/c	Other Flat Fish	Alaska Plaice		Pacific Ocean Complex/b		Northern Rockfish	Shortraker Rockfish	Roughye Rockfish	Other Rock Fish	Atka Mackerel	Squid	Other Species	Total (All Species)
1954	0	0	0	0	12,562	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,562
1955	0	0	0	0	14,690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,690
1956	0	0	0	0	24,697	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,697
1957	0	0	0	0	24,145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,145
1958	6,924	171	6	44,153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	147	51,401
1959	32,793	2,864	289	185,321	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	380	221,647
1960	0	0	1,861	456,103	36,843	0	0	0	0	0	0	0	0	6,100	0	0	0	0	0	0	0	0	500,907
1961	0	0	15,627	553,742	57,348	0	0	0	0	0	0	0	0	47,000	0	0	0	0	0	0	0	0	673,717
1962	0	0	25,989	420,703	58,226	0	0	0	0	0	0	0	0	20,100	0	0	0	0	0	0	0	0	525,018
1963	0	0	14,370	85,810	31,572	0	0	0	0	0	35,643	0	0	45,300	0	0	0	0	0	0	0	0	212,695
1964	174,792	13,649	5,086	111,177	34,233	0	0	0	0	0	30,604	0	0	116,200	0	0	0	0	0	0	0	802	486,543
1965	230,551	15,170	6,087	53,810	10,047	0	0	0	0	0	11,686	0	0	125,900	0	0	0	0	0	0	0	2,986	456,237
1966	261,678	18,354	10,846	102,353	13,105	0	0	0	0	0	24,864	0	0	106,100	0	0	0	0	0	0	0	2,370	539,670
1967	550,362	32,357	13,350	162,228	24,263	0	0	0	0	0	32,109	0	0	75,500	0	0	0	0	0	0	0	12,920	903,089
1968	702,181	58,191	6,047	84,189	35,445	0	0	0	0	0	29,647	0	0	76,400	0	0	0	0	0	0	0	31,006	1,023,106
1969	862,789	50,571	17,682	167,134	36,257	0	0	0	0	0	34,749	0	0	53,300	0	0	0	0	0	0	0	13,547	1,236,029
1970	1,256,565	70,377	12,985	133,079	19,976	12,872	0	0	0	0	64,690	0	0	76,800	0	0	0	0	0	0	0	31,006	1,023,106
1971	1,743,763	45,132	18,042	160,399	42,214	19,373	0	0	0	0	92,452	0	0	31,600	0	0	0	0	0	0	0	16,469	1,674,259
1972	1,874,534	43,340	16,289	47,856	77,384	14,446	0	0	0	0	76,813	0	0	38,900	0	0	0	0	0	0	0	33,340	2,228,809
1973	1,758,919	54,363	8,859	78,240	63,946	12,922	0	0	0	0	43,919	0	0	15,500	0	0	0	0	0	0	0	60,070	2,098,450
1974	1,588,390	63,841	6,735	42,235	78,442	24,668	0	0	0	0	37,357	0	0	36,400	0	0	0	0	0	0	0	69,987	1,949,432
1975	1,356,736	54,389	4,513	64,690	67,789	21,616	0	0	0	0	20,393	0	0	25,200	0	0	0	0	0	0	0	63,133	1,691,785
1976	1,177,822	54,671	4,582	56,221	62,590	19,176	0	0	0	0	21,746	0	0	28,900	0	0	0	0	0	0	0	33,196	1,472,030
1977	985,995	36,597	4,615	58,373	30,161	11,489	0	0	0	0	14,393	0	0	10,734	0	0	0	0	0	0	0	52,072	1,235,492
1978	985,713	45,838	2,013	138,433	42,189	10,140	0	0	0	0	21,040	0	0	7,507	0	0	0	0	0	0	6,734	73,973	1,363,601
1979	923,385	39,354	2,158	99,017	41,409	14,357	0	0	0	0	19,724	0	0	7,210	0	0	0	0	0	0	6,538	51,701	1,234,742
1980	1,016,435	51,649	2,480	87,391	52,553	18,364	0	0	0	0	20,406	0	0	5,797	0	0	0	0	0	0	6,372	47,661	1,330,475
1981	1,029,021	62,458	3,137	97,301	57,321	17,113	0	0	0	0	23,428	0	0	4,844	0	0	0	0	0	0	5,945	42,925	1,363,865
1982	1,013,942	56,566	4,139	95,712	52,122	11,518	0	0	0	0	23,809	0	0	1,238	0	0	0	0	0	0	5,039	23,367	1,309,716
1983	1,041,389	93,167	3,368	108,385	47,558	13,969	0	0	0	0	30,454	0	0	501	0	0	0	0	0	0	3,980	19,140	1,374,902
1984	1,180,617	133,160	3,328	159,526	23,120	9,452	0	0	0	0	44,286	0	0	2,200	0	0	0	0	0	0	3,167	10,178	1,605,321
1985	1,238,489	145,426	3,796	227,107	14,731	7,375	0	0	0	0	71,179	0	0	1,092	0	0	0	0	0	0	1,620	13,553	1,762,419
1986	1,235,090	140,887	6,546	208,597	9,864	6,903	0	0	0	0	76,328	0	0	846	0	0	0	0	0	0	868	11,980	1,730,170
1987	1,266,317	157,746	8,012	181,429	9,599	4,539	0	0	0	0	50,372	0	0	1,934	0	0	0	0	0	0	131	9,724	1,720,485
1988	1,271,000	197,891	6,608	223,156	7,108	5,883	0	0	0	0	137,418	0	0	3,026	0	0	0	0	0	0	417	12,643	1,887,853
1989	1,386,000	168,918	4,500	153,165	8,822	3,222	0	0	0	0	63,452	0	0	4,723	0	0	0	0	0	0	306	5,101	1,816,876
1990	1,426,000	171,008	4,445	80,584	9,620	4,232	0	0	0	0	22,568	0	0	20,289	0	0	0	0	0	0	471	6,325	1,768,995
1991	1,346,464	172,158	3,199	96,135	6,878	13,686	0	0	0	0	30,489	0	0	7,289	0	0	0	0	0	0	574	16,376	1,765,397
1992	1,438,412	206,129	2,104	146,946	2,770	11,980	0	0	0	0	34,825	0	0	13,586	0	0	0	0	0	0	880	33,074	1,996,467
1993	1,358,758	167,390	2,747	105,809	8,468	9,298	0	0	0	0	28,871	0	0	17,138	0	0	0	0	0	0	682	23,953	1,854,065
1994	1,421,402	196,572	2,470	144,544	10,379	14,377	0	0	0	0	60,584	0	0	18,866	0	0	0	0	0	0	588	24,532	1,994,242
1995	1,329,503	245,030	2,048	124,752	8,193	9,283	0	0	0	0	34,908	0	0	15,944	0	0	0	0	0	0	459	22,201	1,929,752
1996	1,218,229	240,590	1,349	130,163	6,376	14,610	0	0	0	0	47,146	0	0	23,078	0	0	0	0	0	0	1,167	21,437	1,844,105
1997	1,142,140	234,641	1,326	166,915	7,666	9,651	0	0	0	0	42,413	0	0	16,747	0	0	0	0	0	0	1,761	22,552	1,779,639
1998	1,125,249	195,645	1,181	101,315	9,124	15,679	0	0	0	0	33,667	0	0	14,863	0	0	0	0	0	0	916	25,604	1,620,921
1999	890,554	162,361	1,211	67,320	5,627	10,573	0	0	0	0	33,095	0	0	18,228	0	0	0	0	0	0	402	18,678	1,302,969
2000	1,133,980	191,056	1,790	84,070	6,974	13,228	0	0	0	0	36,926	0	0	15,597	0	0	0	0	0	0	383	26,108	1,607,847
2001	1,388,276	176,659	1,937	63,578	5,312	14,056	0	0	0	0	27,790	0	0	16,735	0	0	0	0	0	0	1,766	27,177	1,815,227
2002	1																						

Table 5. Summary of stock abundance (biomass), overfishing level (OFL), acceptable biological catch (ABC), the fishing mortality rate corresponding to ABC ( $F_{ABC}$ ), and the fishing mortality rate corresponding to OFL ( $F_{OFL}$ ) for the eastern Bering Sea (EBS), Aleutian Islands (AI), and Bogoslof district as projected for 2006 and 2007. “Biomass” corresponds to projected January abundance for the age+ range reported in the summary. Stock-specific biomass, OFL, and ABC are in metric tons, reported to three significant digits (four digits are used when a stock-specific ABC is apportioned among areas on a percentage basis). Fishing mortality rates are reported to two.

Species or Complex	Area	2006					2007				
		Biomass	OFL	ABC	F <sub>OFL</sub>	F <sub>ABC</sub>	OFL	ABC	F <sub>OFL</sub>	F <sub>ABC</sub>	
Pollock	EBS	8,050,000	2,090,000	1,930,000	0.26	0.24	1,930,000	1,790,000	0.26	0.24	
	Aleutian Islands	130,000	39,100	29,400	0.30	0.22	39,100	29,400	0.30	0.22	
	Bogoslof District	253,000	50,600	38,000	0.20	0.15	50,600	38,000	0.20	0.15	
	BSAI	922,000	230,000	194,000	0.47	0.39	176,000	148,000	0.41	0.34	
Pacific cod	BS	31,000	3,680	3,060	0.13	0.11	3,260	2,700	0.13	0.11	
	AI	33,000	3,740	3,100	0.13	0.11	3,300	2,740	0.13	0.11	
Yellowfin sole	BSAI	1,680,000	144,000	121,000	0.14	0.11	137,000	116,000	0.14	0.11	
Greenland turbot	Total	74,200	14,200	2,740	0.56	0.095	13,400	2,630	0.55	0.095	
	BS			1,890				1,815			
	AI			850				815			
Arrowtooth flounder	BSAI	964,000	166,000	136,000	0.32	0.26	174,000	142,000	0.32	0.26	
Northern rock sole	BSAI	1,490,000	150,000	126,000	0.18	0.15	145,000	122,000	0.18	0.15	
Flathead sole	BSAI	636,000	71,800	59,800	0.36	0.3	67,900	56,600	0.36	0.30	
Alaska plaice	BSAI	1,008,000	237,000	188,000	1.08	0.77	231,000	183,000	1.10	0.77	
Other flatfish	BSAI	121,000	24,200	18,100	0.20	0.15	24,200	18,100	0.20	0.15	
Pacific Ocean perch	BSAI	385,000	17,600	14,800	0.054	0.045	17,600	14,800	0.053	0.045	
	BS			2,960				2,960			
	AI total			11,840				11,840			
	WAI			5,372				5,372			
	CAI			3,212				3,212			
	EAI			3,256				3,256			
Northern rockfish	BSAI	204,000	10,100	8,530	0.059	0.049	9,890	8,320	0.059	0.049	
Shortraker	BSAI	25,800	774	580	0.030	0.023	774	580	0.030	0.023	
Roughye	BSAI	11,900	299	224	0.025	0.019	299	224	0.025	0.019	
Other rockfish	BSAI	26,700	1,870	1,400	0.070	0.053	1,870	1,400	0.070	0.053	
	BS			810				810			
	AI			590				590			
Atka mackerel	Total	446,000	130,000	110,000	0.53	0.44	107,000	91,000	0.53	0.44	
	WAI			41,360				34,220			
	CAI			46,860				38,760			
	EAI/BS			21,780				18,020			
Squid	BSAI	n/a	2,620	1,970	n/a	n/a	2,620	1,970	n/a	n/a	
Other species	BSAI	723,600	93,800	70,400			93,800	70,400			
	BSAI	17,600	1,590	1,190	0.090	0.068	1,590	1,190	0.090	0.068	
	BSAI	492,000	49,200	36,900	0.10	0.075	49,200	36,900	0.10	0.075	
	BSAI	207,000	39,300	29,500	0.19	0.014	39,300	29,500	0.19	0.014	
Octopus	BSAI	7,000	3,710	2,780	0.53	0.40	3,710	2,780	0.53	0.40	
Total	BSAI	17,215,200	3,481,383	3,057,104			3,228,613	2,839,864			

Table 6. Summary of groundfish tier designations under Amendment 56, maximum permissible ABC fishing mortality rate (max  $F_{ABC}$ ), the Plan Team's recommended tier designation, ABC fishing mortality rate ( $F_{ABC}$ ), the maximum permissible value of ABC (max ABC), the Plan Team's recommended ABC, and the percentage reduction (% Red.) between max ABC and the Plan Team's recommended ABC. Stock-specific max ABC and ABC are in metric tons, reported to three significant digits (four significant digits are used when a stock-specific ABC is apportioned among areas on a percentage basis). Fishing mortality rates are reported to two significant digits.

Species or Complex	Area	2006						2007					
		Tier	max $F_{ABC}$	$F_{ABC}$	max ABC	ABC	% Red.	Tier	max $F_{ABC}$	$F_{ABC}$	max ABC	ABC	% Red.
Pollock	EB5	1a	0.24	0.24	1,930,000	1,930,000		1a	0.24	0.24	1,790,000	1,790,000	
	Aleutian Islands	5	0.22	0.22	29,400	29,400		5	0.22	0.22	29,400	29,400	
	Bogoslof District	5	0.15	0.15	38,000	38,000		5	0.15	0.15	38,000	38,000	
	BSAI	3b	0.39	0.39	194,000	194,000		3b	0.34	0.34	148,000	148,000	
Pacific cod	BS	3b	0.11	0.11	3,060	3,060		3b	0.11	0.11	2,700	2,700	
	AI	3b	0.11	0.11	3,100	3,100		3b	0.11	0.11	2,740	2,740	
	BSAI	3a	0.11	0.11	121,000	121,000		3a	0.11	0.11	116,000	116,000	
Yellowfin sole	Total	3b	0.44	0.095	11,400	2,740	76%	3b	0.44	0.095	10,700	2,630	75%
Greenland turbot	BS					1,890						1,815	
	AI					850						815	
Arrowtooth flounder	BSAI	3a	0.26	0.26	136,000	136,000		3a	0.26	0.26	142,000	142,000	
Northern rock sole	BSAI	3a	0.15	0.15	126,000	126,000		3a	0.15	0.15	122,000	122,000	
Flathead sole	BSAI	3a	0.3	0.3	59,800	59,800		3a	0.3	0.3	59,800	56,600	
Alaska plaice	BSAI	3a	0.77	0.77	188,000	188,000		3a	0.77	0.77	183,000	183,000	
Other flatfish	BSAI	5	0.15	0.15	18,100	18,100		5	0.15	0.15	18,100	18,100	
Pacific Ocean perch	BSAI	3b	0.045	0.045	14,800	14,800		3b	0.045	0.045	14,800	14,800	
BS	BS				2,960	2,960					2,960	2,960	
	AI total				11,840	11,840					11,840	11,840	
	WAI				5,372	5,372					5,372	5,372	
	CAI				3,212	3,212					3,212	3,212	
	EAI				3,256	3,256					3,256	3,256	
Northern rockfish	BSAI	3a	0.049	0.049	8,530	8,530		3a	0.049	0.049	8,320	8,320	
Shortraker	BSAI	5	0.023	0.023	580	580		5	0.023	0.023	580	580	
Rougheye	BSAI	5	0.019	0.019	224	224		5	0.019	0.019	224	224	
Other rockfish	BSAI	5	0.053	0.053	1,400	1,400		5	0.053	0.053	1,400	1,400	
BS	BS				810	810					810	810	
	AI				590	590					590	590	
Atka mackerel	Total	3a	0.44	0.44	110,000	110,000		3a	0.44	0.44	91,000	91,000	
	WAI				41,360	41,360					34,220	34,220	
	CAI				46,860	46,860					38,760	38,760	
	EAI/BS				21,780	21,780					18,020	18,020	
Squid	BSAI	6	n/a	n/a	1,970	1,970		6	n/a	n/a	1,970	1,970	
Other Species		5	n/a	n/a	70,400	70,400		5	n/a	n/a	70,400	70,400	
	Sharks	5	0.068	0.068	1,190	1,190		5	0.068	0.068	1,190	1,190	
	Skates	5	0.075	0.075	36,900	36,900		5	0.075	0.075	36,900	36,900	
	Sculpins	5	0.14	0.14	29,500	29,500		5	0.14	0.14	29,500	29,500	
	Octopus	5	0.4	0.4	2,780	2,780		5	0.4	0.4	2,780	2,780	
Total	BSAI				3,065,764	3,057,104					2,851,134	2,839,864	

